The History of FreeFEM

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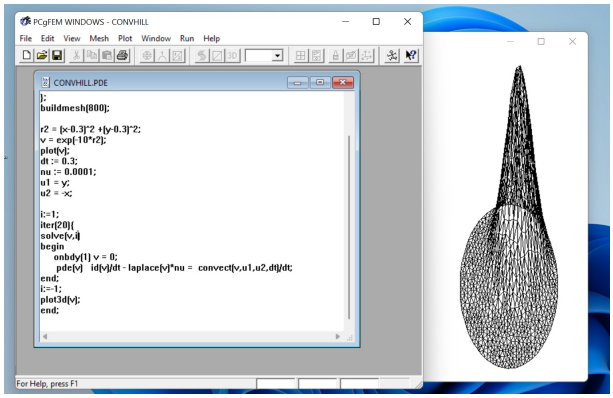
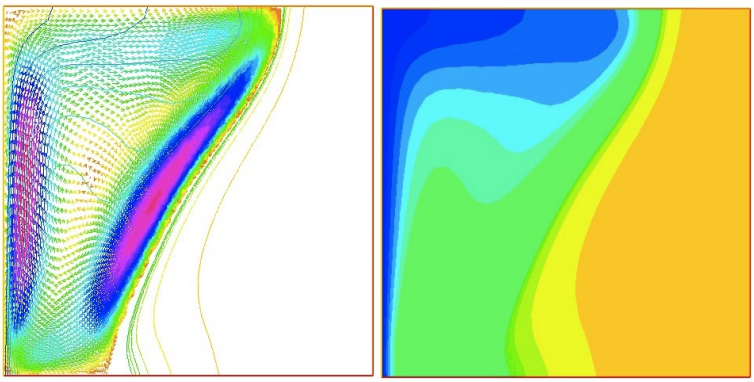
`FreeFem++` is a software to solve numerically partial differential equations (PDE) in volumes , curves or surfaces of $\mathbb{R}^2$, $\mathbb{R}^3$. based on variational formulations and the finite elements method.
The user writes a program called a `FreeFem++ script` in a high level domain-specific language (DSL) which is close to the mathematical formulation of PDEs including linear algebra, linear and bilinear forms, interpolation operators, etc. The syntax is an extension of a subset of `C++`.
FreeFem++ is free and open source ; it runs on Mac, Unix and Windows architectures, also in parallel with MPI (Pierre Jolivet has solved a problem with $22 \cdot 10^9$ unknowns on 12000 processors). You can even try it inside a browser, smartphones included, see : `www.ljll.math.upmc.fr/lehyaric/ffjs/`.
The success of `FreeFem++` is measured by the large number of users and its longevity : the first line of code was written in `pascal` on the first Apple Macintosh in 1982. Up to 1995 it was a commercial product called MacgFEM and PCFEM.



The 1995 version of PCFEM can still be executed in Microsoft Windows

It is interesting to reflect on the reasons why no one has succeeded in writing a more powerful tool (compare with matlab pde-toolbox, py-pde, comsol, fenics), to solve PDEs and why forty years later it is not a deprecated product.



Phase change (left) due to natural convection (right)

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